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Letter to Editor

Artificial intelligence acquiescence as real-time guidance in USG peripheral nerve block-Need of the hour

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Sir,

Artificial Intelligence (AI) has attained new frontiers in every field, including anaesthesiology. The application of the algorithm, empowerment of machines to analyze and solve troubles, word/ object perception, and governing decision-making outlines the basic concept of AI definition.[1]

Rapidly accumulating evidence demonstrates the effective application of AI in various aspects of perioperative anesthesia practice, such as monitoring depth of anesthesia, controlling TCI pumps, predicting risks, managing operating theatre logistics, providing pain management, and assisting in ultrasound-guided (USG) regional anesthesia procedures. However, the application of USG is accompanied by numerous technical arduous in non-experienced clinicians and can lead to serious complications.

The recent approval by the Food and Drug Administration (FDA) of the Scan Nav™ Anatomy Peripheral Nerve Block (PNB) system (Intelligent Ultrasound Group, Cardiff, United Kingdom), the only AI medical device of its kind, could prove to be a significant advancement for anesthesiologists and other healthcare professionals.[2] This system aids in identifying crucial anatomical structures in ultrasound-guided (USG) images before needle insertion in peripheral nerve blocks (PNB), potentially enhancing the precision and safety of these procedures. The technology utilizes deep learning AI on the live ultrasound image, generating distinct colours delineating key anatomical structures.

In a study involving non-experts in ultrasound-guided (USG) peripheral anesthesia, teaching sessions on USG scanning for peripheral nerve blocks (PNB) were conducted.[3] Half of the participants performed scans with the assistance of AI, while the other half did so without AI. The author observed that the use of AI led to improved acquisition and interpretation of USG images in non-experts. The study suggests that the future use of the ScanNav Anatomy Peripheral Nerve Block system could enhance the performance of novices in USG-guided procedures.[3] The technology highlights ten vital areas of sono-anatomy pertinent to ultrasound-guided regional anesthesia, including Supraclavicular, Interscalene, Axillary, and Brachial plexus for the upper limb, and Erector Spinae Plane, Rectus Sheath, Femoral nerve, Adductor canal, Popliteal, and Supra-inguinal Fascia Iliaca for the lower limb.[3,4]

The interpretation and acquisition of sono-anatomical images, a crucial skill in ultrasound-guided regional anesthesia, is known to vary even among experts. AI training in this technology is specifically designed to train

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needle-probe orientation and anatomy-elucidation skills before performing on patients. Additionally, 3D images can improve relevant sono-anatomy views and probe positioning during virtual scanning of structures.[5]

In the era of no opioid and multimodal regimen for perioperative and postoperative analgesia, the horizon of these AI technologies can further support the use of USG-guided regional anaesthesia, thereby imparting better patient care by avoiding the need to perform directly on the patients and thereby reducing the risk of complications. In 2021, the Royal College of Anaesthesia introduced its teaching curriculum, competence in USG regional anaesthesia (RA) as a core learning outcome.[6] It has been suggested that to increase the adoption of ultrasound-guided regional anesthesia (USG RA) techniques among anesthesiologists, it is crucial to focus on learning high-value, basic blocks.[7] This approach prioritizes simpler techniques over complex ones.[4] Therefore, innovation in technology and training is essential to facilitate widespread learning. Preliminary reports indicate that AI technology could be effective in achieving these goals.

The commencing data indicates the significant potential of AI in improving the safety of regional anesthesia. This technology can also be further utilized in the paediatric population, where regional anesthesia is integral to many enhanced recovery protocols, addressing the often-unmet need for effective pain relief in this subset. Learning is difficult in small children due to the small margin of safety and hand-eye coordination may take a long time. Deep learning techniques to produce a real-time overlay of B-mode ultrasound to enhance relevant anatomical images may aid learning in non-experts and thereby decreasing the rate of complications and inadequate analgesia. In the near future, the development of AI in the learning and acquisition of expert skills in paediatric regional anaesthesia is highly recommended.[8]

The integration of artificial intelligence for real-time guidance in ultrasound-guided peripheral nerve blocks is a critical advancement, promising to revolutionize regional anesthesia and enhance patient care. This progress holds a promising future for perioperative practices, with widespread adoption of ultrasound machines integrated with AI-assisted colour enhancement for sono-anatomy imaging on the horizon.

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